MULTIMEDIA UNIVERSITY

TABLE NO: | | |

STUDENT ID NO: | | | | | | | | | | |

VENUE: _____

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2018/2019

PSP0101 – PROBLEM SOLVING AND PROGRAM DESIGN

(All sections / Groups)

31 MAY 2019
9.00 a.m. – 11.00 am
(2 Hours)

Question	Mark
1	
2	
3	
4	
Total:	

Examiner 1 Signature: _____

Examiner 2 Signature: _____

INSTRUCTIONS TO STUDENT

1. This Question paper consists of 14 printed pages (including cover page) with 4 Questions only.

2. Student must attempt **ALL QUESTIONS**. All questions carry equal marks (25 marks). The distribution of the marks for each question is given.

3. Please print all your answers **CLEARLY** in the specific answer boxes provided for each question. Submit this question paper at the end of the examination.

QUESTION 1 [25 Marks]

a. Given an equation involving 3 unknowns a, b, and c below:

$$c = a + \frac{3}{b}$$

Using an IPO chart, show how to **determine the value of b given a and c.**

[6 marks]

Input	Process	Output

b. Draw a flowchart to accept a positive integer N, and then display all numbers between 0 and N (i.e. inclusive of 0 and N) in **ascending order.**
(NOTE: Assume that the value N entered by user is always positive.)

[7 marks]

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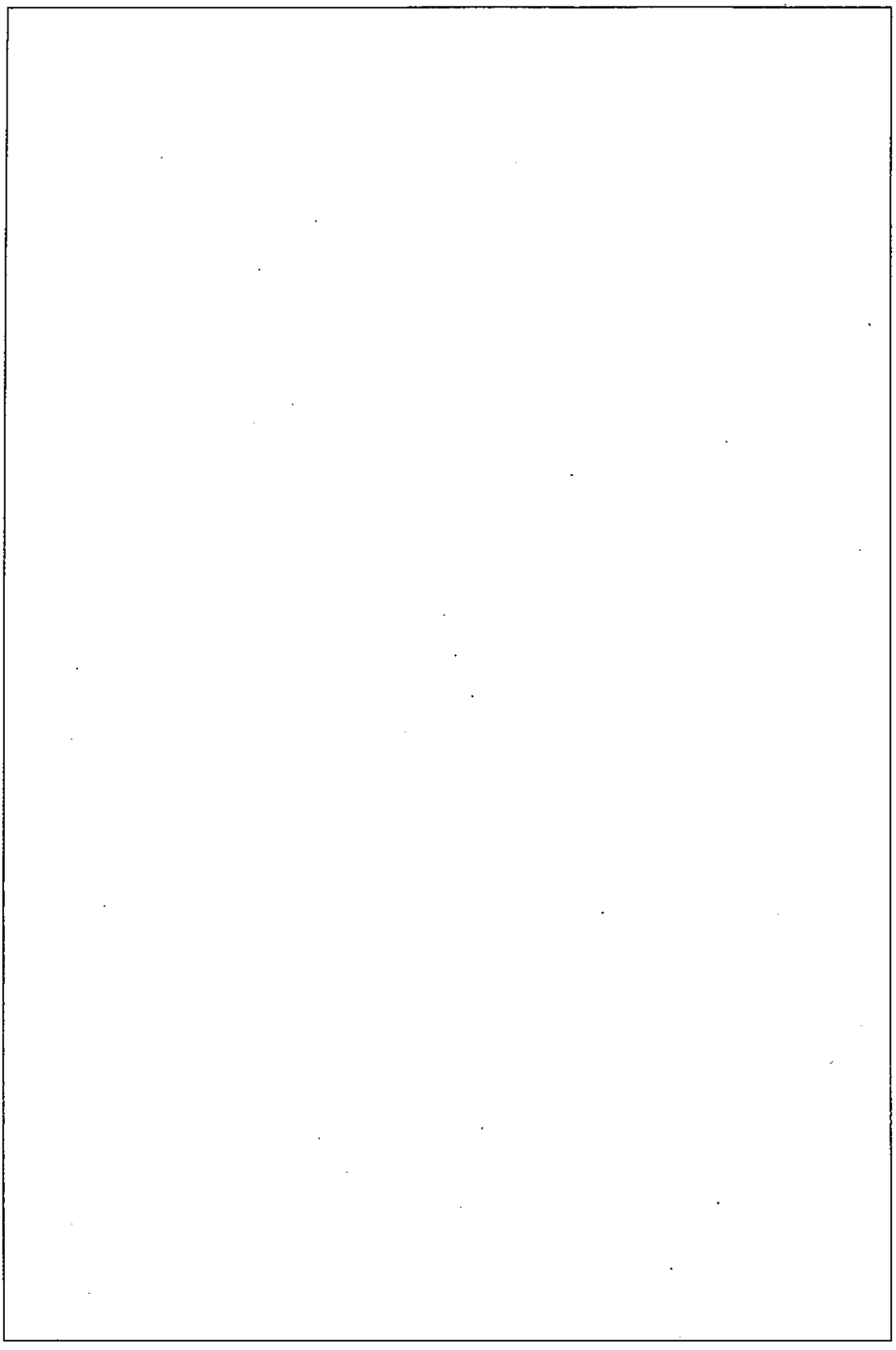

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c. To encourage students to do well in studies, MMU rewards students with good GPAs with tuition fee discounts in every trimester. The table below shows the tuition fee discount scheme for students.

GPA	Discount (%)
Less than 3.5	0
3.5 to less than 3.8	10
3.8 to 4.0	20

Write a program that calculates the discounted tuition fee amount a student has to pay for **three trimesters**, given the students GPAs for each of the three trimesters. Assume that the **tuition fee for each trimester is RM1000**, and that the GPAs entered are valid (i.e. between 0 and 4). Your program should follow the sample output shown below. User input are underlined and made bold.

Sample Program Output 1:

```
Enter GPA for Trimester 1: 3.2
Enter GPA for Trimester 2: 3.5
Enter GPA for Trimester 3: 3.8
Amount to pay = RM2700
```

Sample Program Output 2:

```
Enter GPA for Trimester 1: 3.9
Enter GPA for Trimester 2: 3.4
Enter GPA for Trimester 3: 2.8
Amount to pay = RM2800
```

[12 marks]

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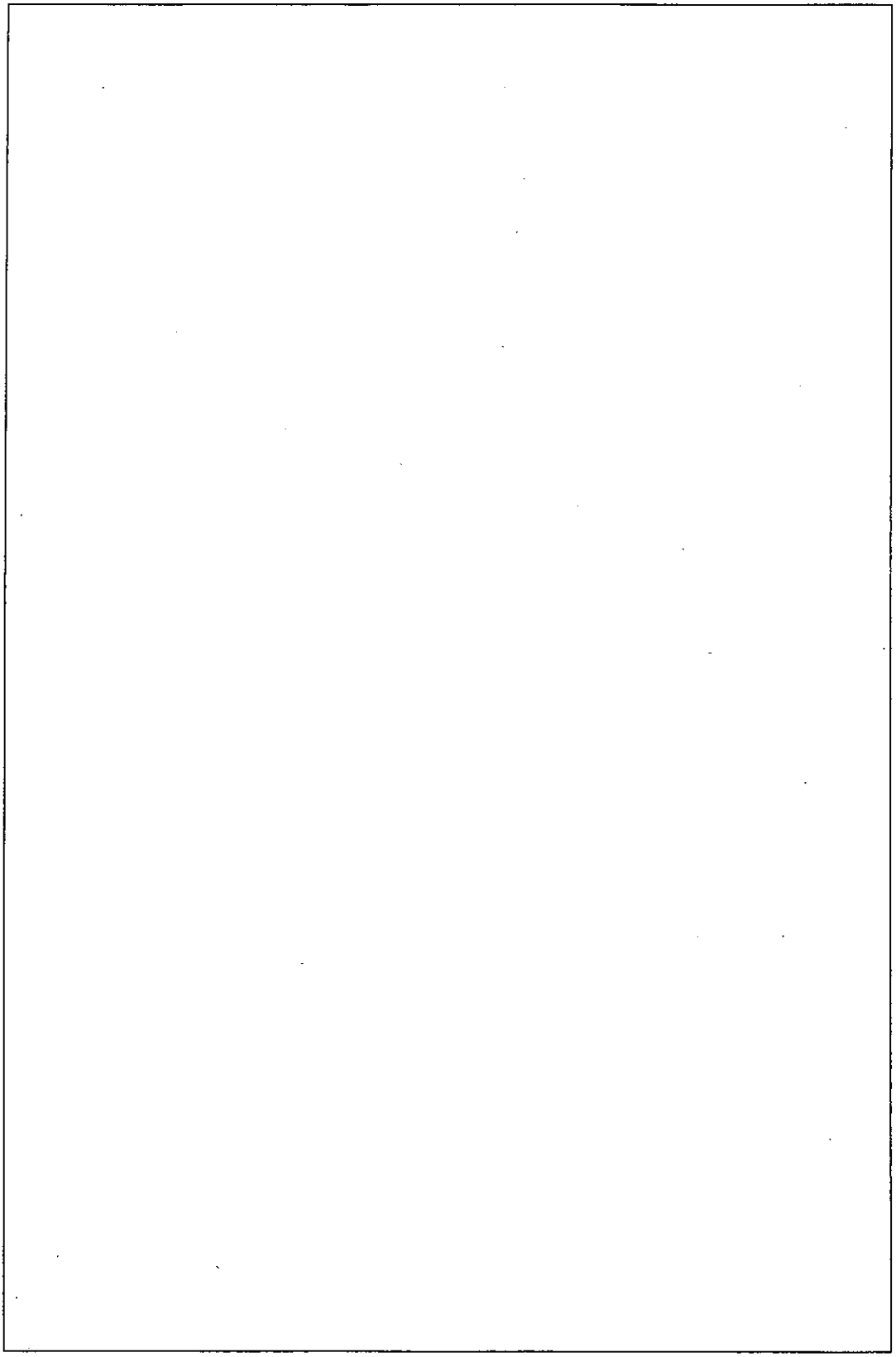

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QUESTION 2 [25 Marks]

a. The subtraction of two fractions can be expressed as the following equation:

$$\frac{a}{b} - \frac{c}{d} = \frac{e}{f}$$

Here, unknowns $a, b, c, d, e,$ and f are all integers.

Create an IPO chart that shows how to compute the subtraction of two fractions. The input and output of the IPO chart must consist of unknowns in the equation above. The result of the subtraction **need not** be in simplified form.

[6 marks]

Input	Process	Output

b. Draw a flowchart that continuously accepts an integer until the integer is zero. If the integer is not zero, print "Positive" or "Negative" depending on whether the integer is positive or negative.

A sample output of a program written according to your flowchart should be as follows (note: user input is underlined):

```
3
Positive
-2
Negative
0
```

[11 marks]

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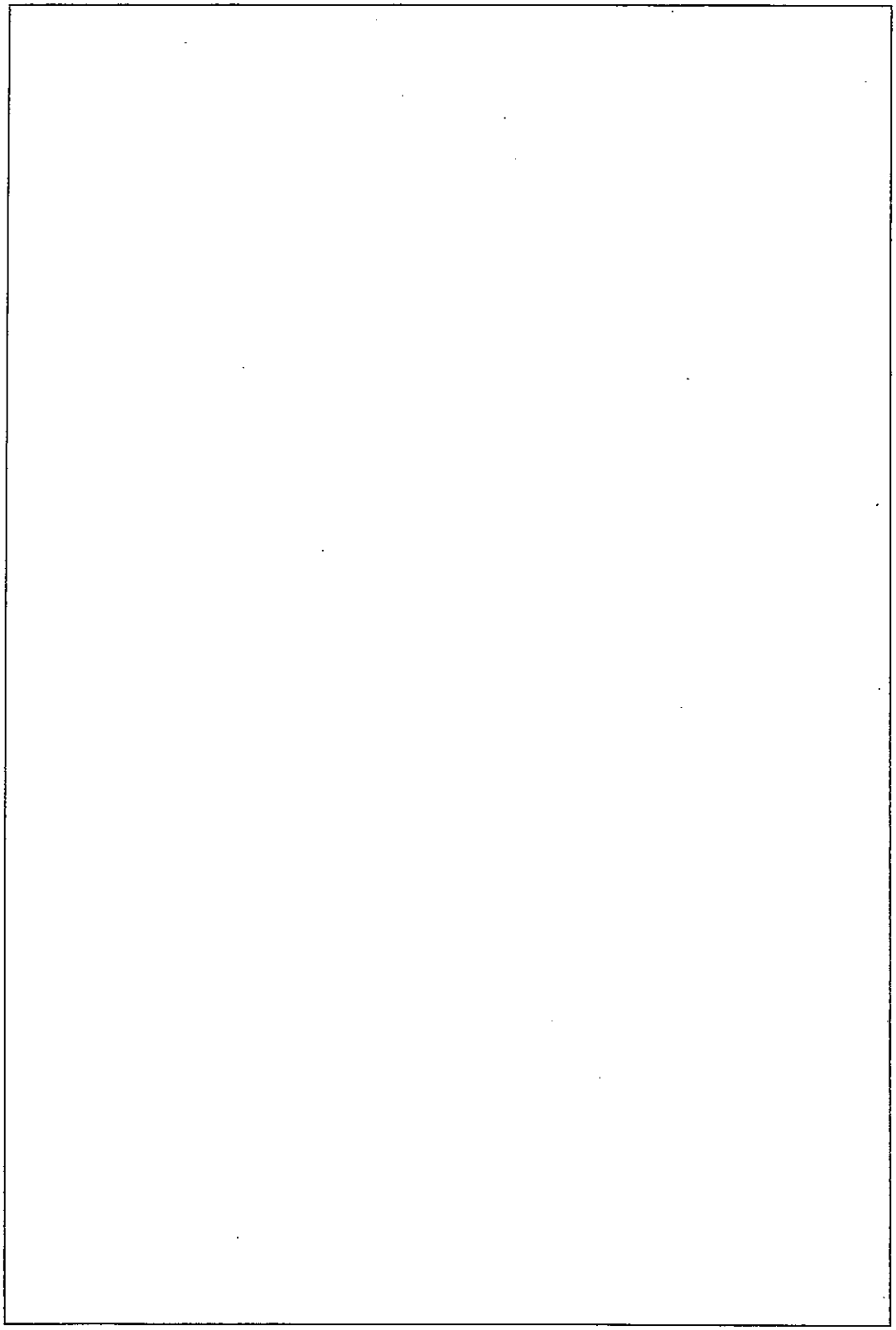

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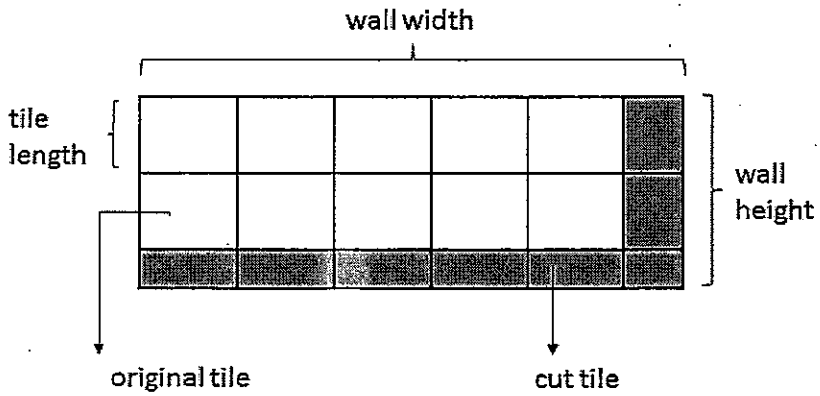
c. Tony wants to tile his kitchen wall, so he needs to estimate how many tiles are required. He knows the size of his **rectangular kitchen wall**, and the size of the **square tile** he wants to use. He is aware that two scenarios might occur: either all the tiles can fill the kitchen wall perfectly, or some tiles might need to be cut to fill the kitchen wall perfectly. Figure below illustrates the second scenario in which the gray tiles are tiles that are cut.



Write a program that accepts the kitchen wall's width and height and the tile's length, all of which are integers. The program then outputs the number of tiles required to fill the kitchen wall in a grid layout. If some tiles need to be cut, the program should also output number of tiles that needs to be cut.

Your program should follow the sample output shown below. User input are underlined and made bold.

Sample Program Output 1:

```
Enter wall width: 17
Enter wall height: 7
Enter tile length: 3
Number of tiles required = 18
Number of tiles to cut =8
```

Sample Program Output 2:

```
Enter wall width: 10
Enter wall height: 4
Enter tile length: 2
Number of tiles required = 10
```

[8 marks]

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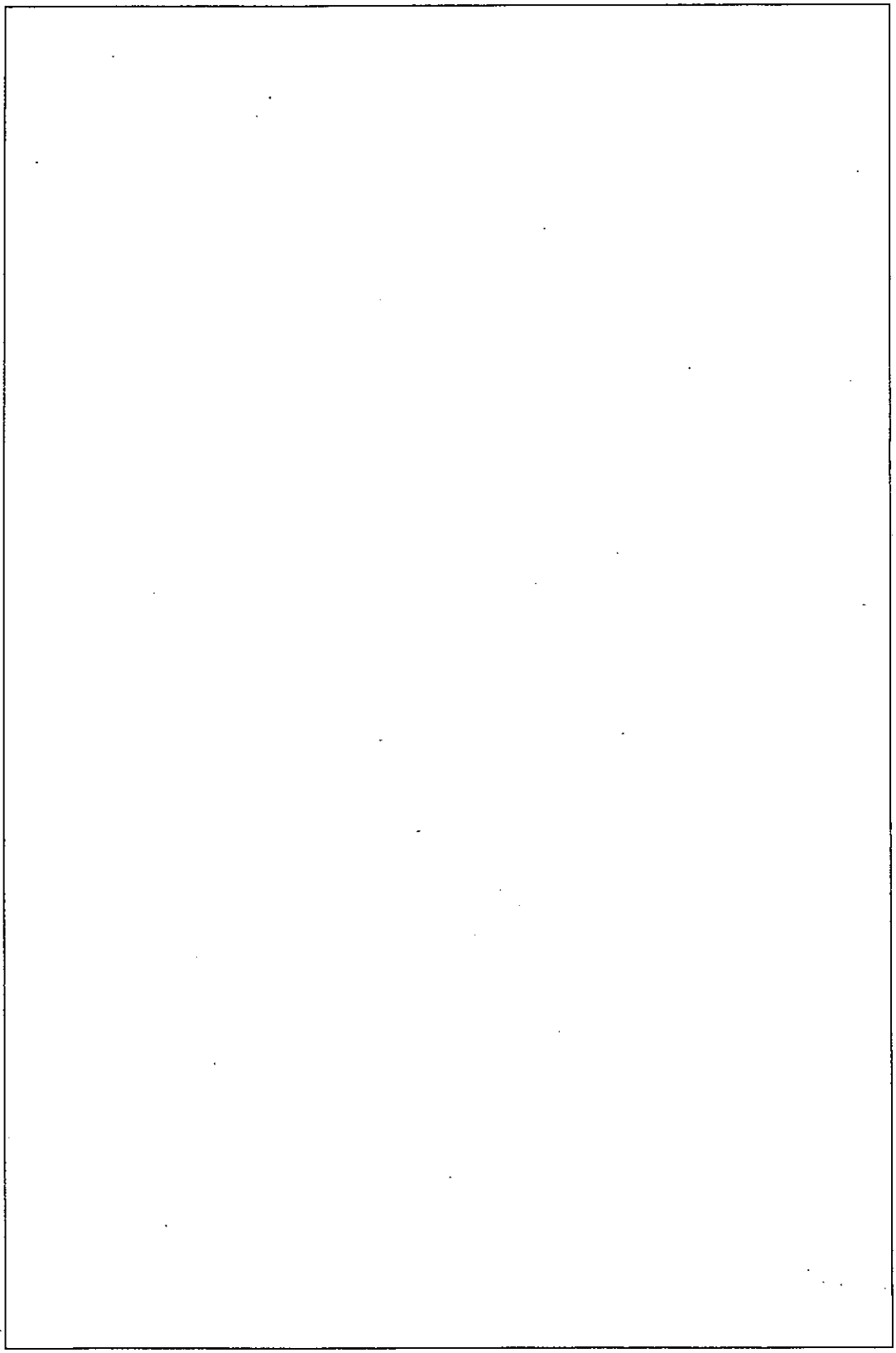

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QUESTION 3 [25 Marks]

a) You write a program that creates an array of numbers, then sums all the numbers located at even indexes of the array (0, 2, 4, 6, etc.)
   i. What loop is the best for this program? Explain your answer briefly. [2 marks]
   ii. Write a code for the program. [7 marks]

a) You write a program that calculates the entry fee for a theme park. The program asks the total number of visitors in a group, then asks the age of the visitors one by one. The entry fee is RM10 if the age of a visitor is 12 or less, and RM20 if the age is more than 12. The program prints the total entry fee for the group after all ages are entered. Draw a **flowchart** for the above program. [16 marks]

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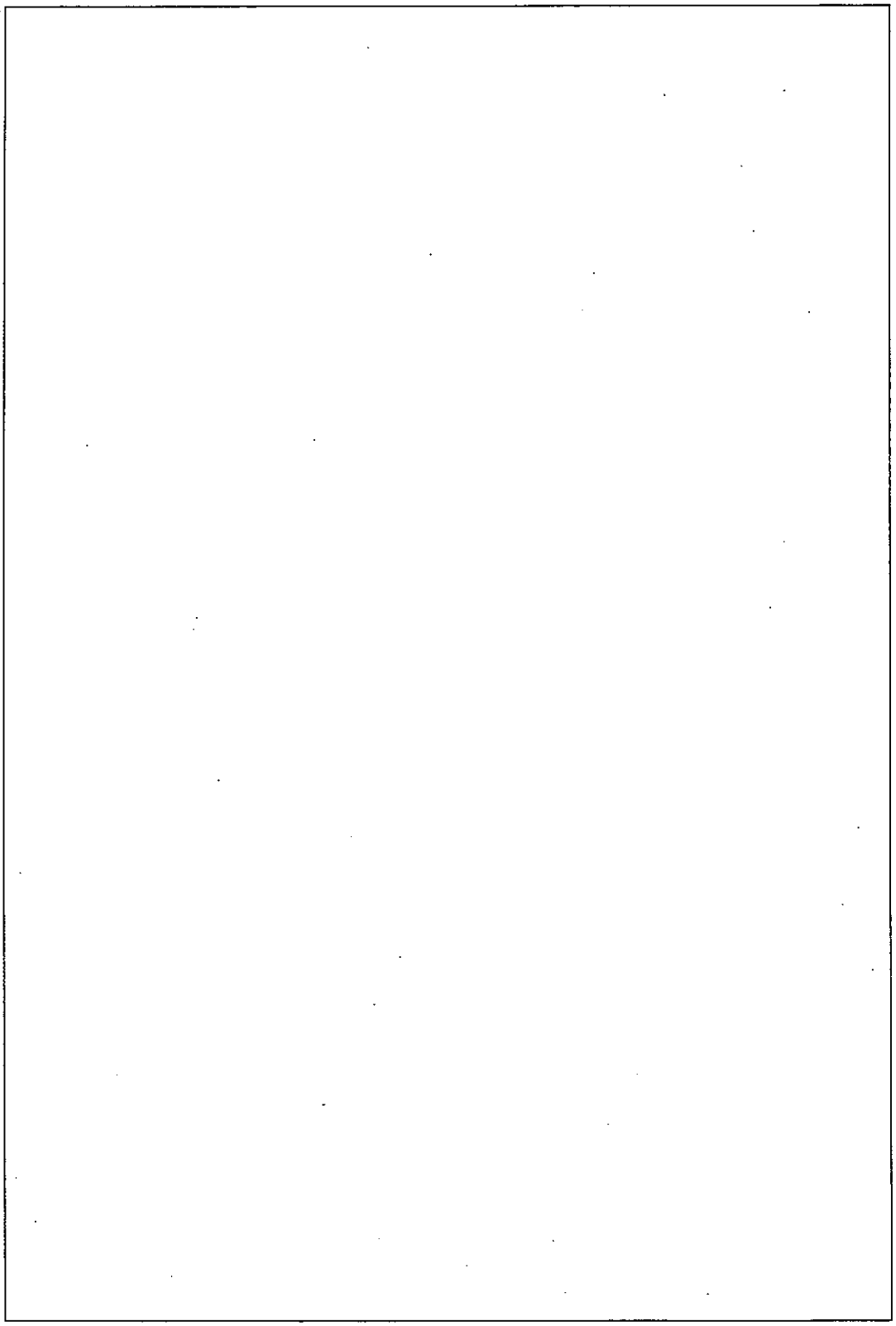

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QUESTION 4 [25 Marks]

a) You write a program that collects from user input the name, id and exam mark of students one by one. After all user input are entered, your program determines the exam result (pass or fail) for each student based on their exam mark. Your program then print all student data and their exam result. How many arrays do you need? State the data stored in each array. [5 marks]

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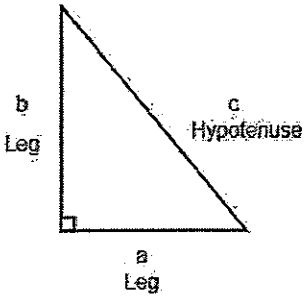
b) You have to determine whether a triangle is right-angled. For a triangle to be considered right-angled, the square of the length of the hypotenuse, c, (the longest side of a right triangle) must equal the sum of the squares of the lengths of the other two sides (a and b). Thus,

$$c = \sqrt{a^2 + b^2}$$



Write a complete pseudocode (using **functions**) to perform the task. Your pseudocode shall include the following functions:

i. A function definition named **GetDimensionInput** that gets and returns user input for the three dimensions (a, b and c).

ii. A function definition named **IsRightAngle** that returns a boolean value based on whether or not the values obtained in GetDimensionInput function forms a right-angle triangle.

iii. A main function that calls the above two functions, and print message "Is right angle" or "Not right angle" based on the result of IsRightAngle function.

Choose your function parameters and return values adequately.

Your program should follow the sample output shown below. User input are underlined and made bold.

Sample Program Output 1:

```
Enter a: 3
Enter b: 4
Enter c: 5
Is right-angled
```

Sample Program Output 2:

```
Enter a: 3
Enter b: 5
Enter c: 7
Not right-angled
```

[20 marks]

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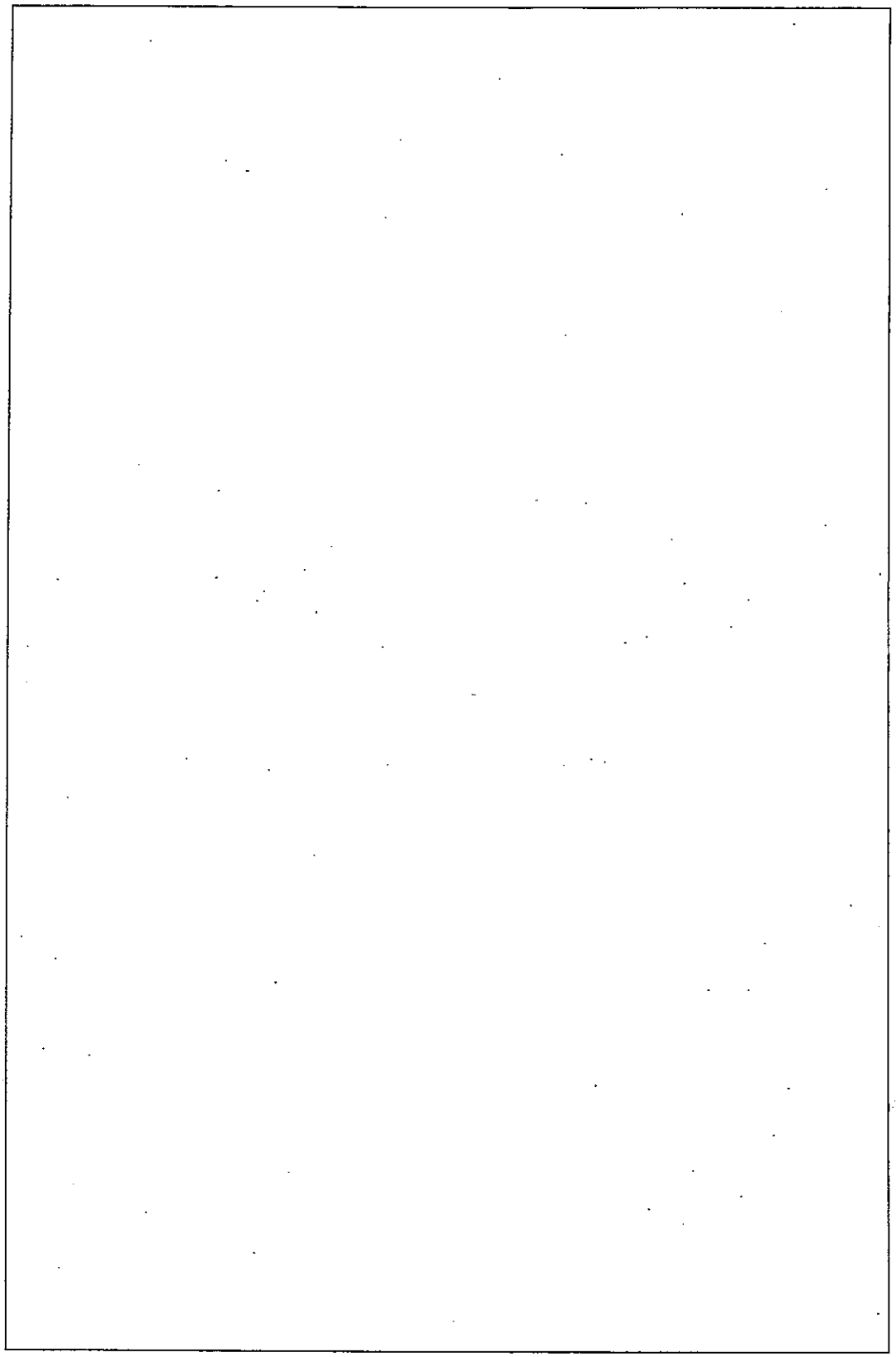

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